

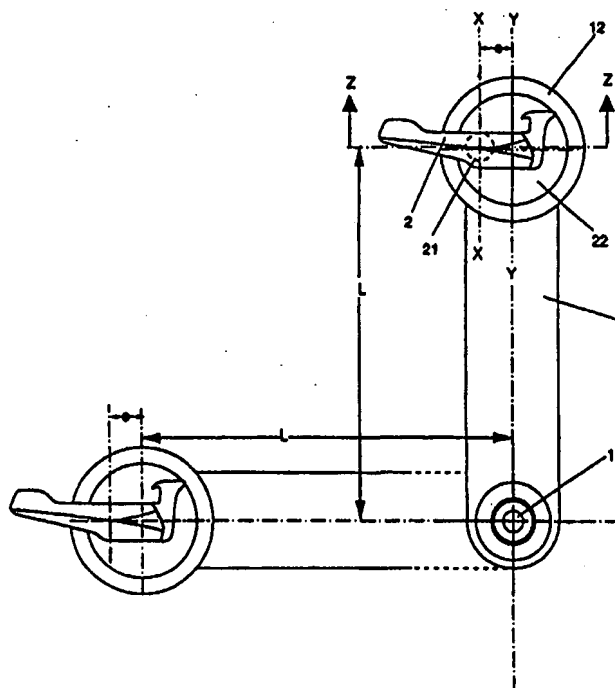


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(54) Title: PEDAL CRANK DEVICE FOR A BICYCLE AND BICYCLE USING THE SAME**(57) Abstract**

Pedal-pedal crank advancement control device for a bicycle, of the type in which there are two opposite, equal and symmetrical pedal-pedal cranks, one on one side and one on the other side of the bicycle frame, engaged to it and keyed with said engagement to a gear wheel intended for driving the motion by a chain to a freewheel axially keyed to the back wheel of the same bicycle, where each pedal crank (1) involves a pedal (2) engaged to its free end, characterized in that it has a system for keying the pedal to the pedal crank with respect to its substantial engagement, independently from the pedal crank angular position.



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DESCRIPTION

PEDAL CRANK DEVICE FOR A BICYCLE AND BICYCLE USING THE SAME

Technical Field

The present invention has for object a pedal-pedal crank advancement control device for bicycle and respective bicycle with said pedal-pedal crank.

Background Art

In prior art the traditional pedal-pedal crank control devices for bicycle advancement are known, in which the pedal engages to the pedal crank and the pedal crank engages in its turn to the bicycle frame where by means of a gear wheel it drives the motion by chain to the back wheel of the same bicycle.

For obviating certain speed conditions and torque need on the pedal the traditional bicycles are traditionally provided with a gear-change which acts both on the pedal crank gear wheel and on the sprocket (generally a freewheel one) coaxial to the back wheel (generally on both by means of different gearing diameters).

The prior art drawbacks substantially derive from that the engagement points between frame pedal crank and between pedal crank and pedal are fixed thus some upper dead point and lower dead point conditions (high pedal on one side and low pedal on the other side) are created which make the push exerted by the foot in said conditions little effective.

A further problem derives from that the pedal and pedal crank structures are always critical and always need a suitable dimensioning for avoiding the risk of breakage.

1 Another drawback derives from the very high concentration of the
2 pushes which subject some bending stresses to concentration
3 particularly in the engagement zones, compromising the effectiveness
4 and the life of the respective bearings.

5 Furthermore the dimensioning involves an increase of the bicycle
6 weight to the detriment of the advancement yield.

7 Purpose of the present invention is that of obviating the above
8 mentioned drawbacks.

9 The problem is solved as claimed by means of a pedal-pedal crank
10 advancement control device for bicycle and respective bicycle with
11 said pedal-pedal crank, of the type in which there are two opposite
12 alike and symmetrical pedals-pedal crank, one on one side and one on
13 the other side of the bicycle frame, engaged to it and keyed by said
14 engagement to a gear wheel intended to drive the motion by a chain to
15 a freewheel axially keyed to the back wheel of the same bicycle, where
16 each pedal crank has engaged to its free end a pedal,
17 characterized in that:

18 - said pedal is rigidly fastened in forward eccentric position respect to
19 the advancement direction when the pedal is substantially positioned at
20 the upper dead point, to a disk-shaped flange substantially axially
21 engaged along the middle of said pedal crank;

22 - on the eccentric keying axis of said pedal, a gear sprocket is
23 rotationally free engaged which is internally keyed to a crown gear
24 which is integrated into the containing crown of said disk-shaped
25 flange in said free end of said pedal crank;

26 - being the gearing pitch such that during said pedal crank rotation
27 the eccentric keying axis of said pedal, is always placed forward
28 substantially parallel to the resting plane of said pedal.

1 Thus an extremely advantageous structure is obtained, mainly
2 functional and reliable, able to give a bigger middle torque and thus
3 also a higher yield.

4 Thus the keying system of the pedal to the pedal crank keeps the pedal
5 keying axis always placed forward respect to its substantial
6 engagement, independently from the pedal crank angular position,
7 thus making the pedal crank arm (distance from the centre of the pedal
8 to the pedal crank rotation centre) variable according to the pedal
9 crank angular position.

10 Advantageously the pedal-pedal crank control device for bicycle is
11 further characterized in that said rotationally idle gear sprocket is
12 gearing in said pedal crank crown gear on the internal side of the same
13 that is on the opposite side of said pedal keying disk-shaped flange.

14 Thus an optimal structure is obtained.

15 These and other advantages will appear from the following description
16 of a preferential embodiment solution, with the aid of the enclosed
17 drawings, whose execution details are not to be considered as limitative
18 but only given as examples.

19 Figure 1 is a view of the pedal-pedal crank substantially in two vertical
20 and horizontal positions showing the forward constant position of the
21 pedal with varied distance during the pedal crank rotation (greater
22 when it is horizontal).

23 Figure 2 is a back view of the pedal-pedal crank in vertical position as
24 in Fig. 1, showing the sprocket-crown gearing of the pedal to the pedal
25 crank.

26 Fig. 3 is a Z-Z axial section view respect to Fig. 1 of the pedal-pedal
27 crank gearing.

28 According to the figure it can be noticed that:

1 The pedal crank is indicated with 1 and the pedal with 2.
2 The pedal crank has a holed end for the engagement to the bicycle
3 frame (11) for the keying of the respective driving gear wheel to the
4 chain, while the other opposite free end has an housing crown 12
5 which on one side houses a disk-shaped flange (22) rotationally free to
6 rotate, rigidly keyed by eccentric axis with value "e" to the pedal (2).
7 On this eccentric axis (X-Y; 22) a rotationally free gear sprocket (23)
8 which gears in an internal crown gear (13) of the pedal crank (1) end,
9 is keyed on the internal part.
10 The sprocket-crown (23-13) gearing is obtained so that to a pedal crank
11 turn corresponds an inverse turn of the pedal, so that keeping the
12 pedal always horizontal, independently on the pedal crank (1) angular
13 position respect to its rotation centre (11), the eccentricity "e" of the
14 keying axis (22) of the pedal (2) is always placed forward, substantially
15 obtaining:
16 - when the pedal is high, it is placed forward respect to the rotation axis
17 vertical of the pedal crank (11) of a value "e" while the pedal distance
18 from the pedal crank rotation centre is equal to a value "L" and a motor
19 moment equal to " $P \times e$ " is obtained, where "e" is the eccentricity and
20 "P" is the vertical force exerted on the pedal.
21 - when the pedal is all placed forward (horizontal pedal crank) the
22 pedal distance from the pedal crank rotation centre is progressively
23 increased to a value $(L + e)$ increasing the respective moment and
24 therefore the torque,
25 - vice versa for the opposite positions of the other pedal.
26 Thus a continuous variability during the pedal stroke of the effective
27 pedal stroke arm defined by the pedal (2) distance from the pedal crank
28 (11) rotation centre is obtained.

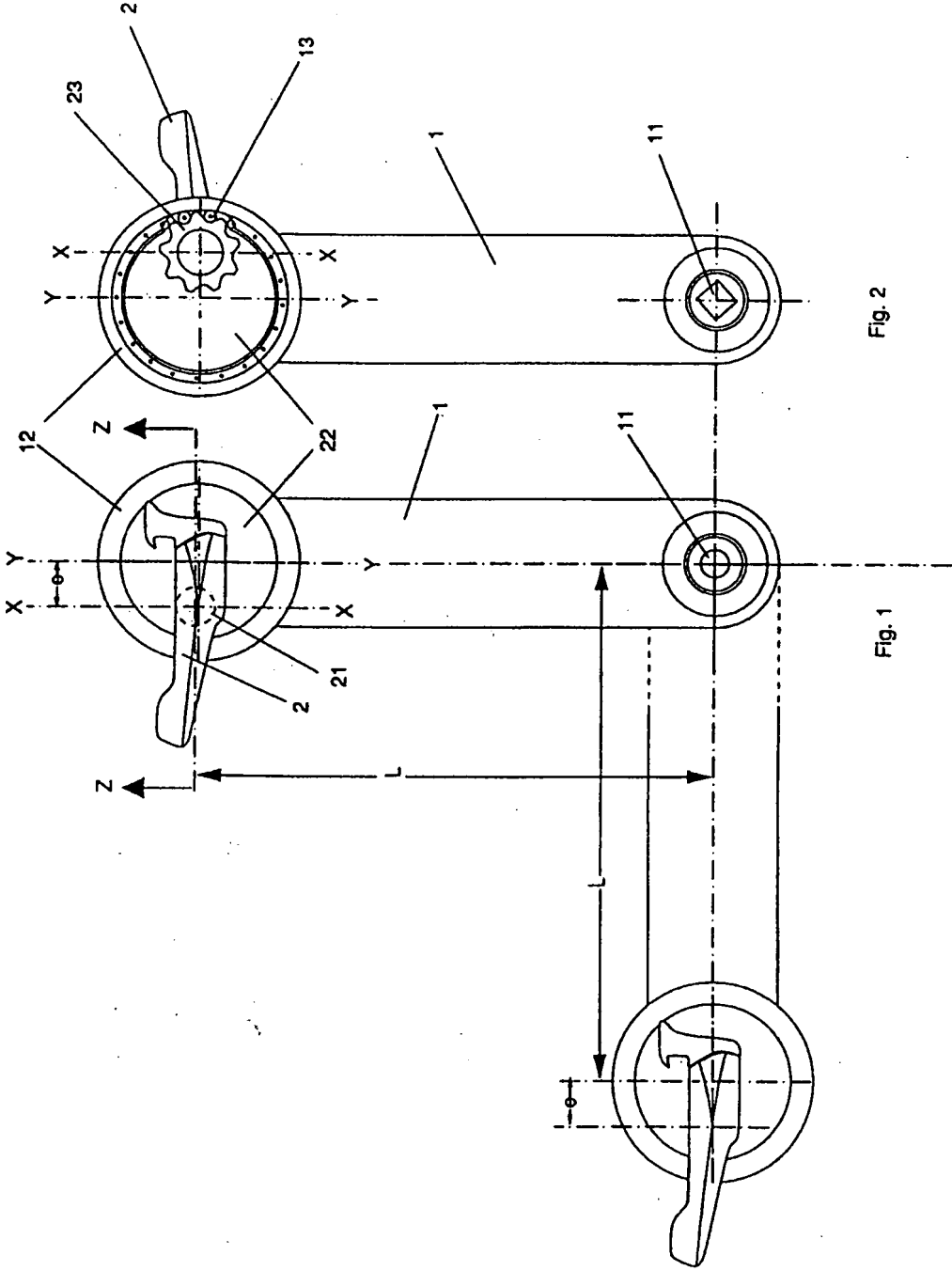
1 The structure realized further allows a higher drive strength and a
2 decidedly better division of the forces on the wider rotational surfaces
3 respect to the present engagement systems, with consequent
4 mechanism longer life and resistance and performance.

5 The rather frequent engagement breakage in the pedal is thus also
6 avoided.

7 The pedal forced by the foot to remain always horizontal, forces the
8 effective pedal crank arm, thanks to the eccentricity and constrained
9 sprocket-crown (23-13) gearing, to vary continuously according to an
10 optimal condition.

Claims

- 1
2 1. Pedal-pedal crank advancement control device for bicycle, of the
3 type in which there are two opposite, equal and symmetrical pedals-
4 pedal cranks, one on one side and one on the other side of the bicycle
5 frame, engaged to it and keyed with said engagement to a gear wheel
6 intended for driving the motion by a chain to a freewheel axially keyed
7 to the back wheel of the same bicycle, where each pedal-crank (1)
8 involves a pedal (2) engaged to its free end, characterized in that:
9 - said pedal (2) is rigidly fastened in forward eccentric position (X-X 21)
10 respect to the advancement direction when the pedal (2) is
11 substantially positioned at the upper dead point, to a disk-shaped flange
12 substantially axially engaged (Y-Y) along the middle of said pedal
13 crank (1);
14 - on the eccentric keying axis (21) of said pedal (2), a gear sprocket is
15 rotationally free engaged which is internally keyed to a crown gear
16 (13) which is integrated into the containing crown of said disk-shaped
17 flange in said free end of said pedal crank (1);
18 - being the gearing pitch such that during said pedal crank (1) rotation
19 the eccentric keying axis (21) of said pedal (2), is always placed forward
20 substantially parallel to the resting plane (Z-Z) of said pedal (2).
21 2. Pedal-pedal crank advancement control device for bicycle according
22 to claim 1, characterized in that said rotationally idle gear sprocket (21)
23 is gearing in said pedal crank crown gear (12) on the internal side of
24 the same that is on the opposite side of said pedal (2) keying disk-
25 shaped flange (22).
26 3. Bicycle provided with a couple of pedals-pedal crank according to
27 any of the previous claims.



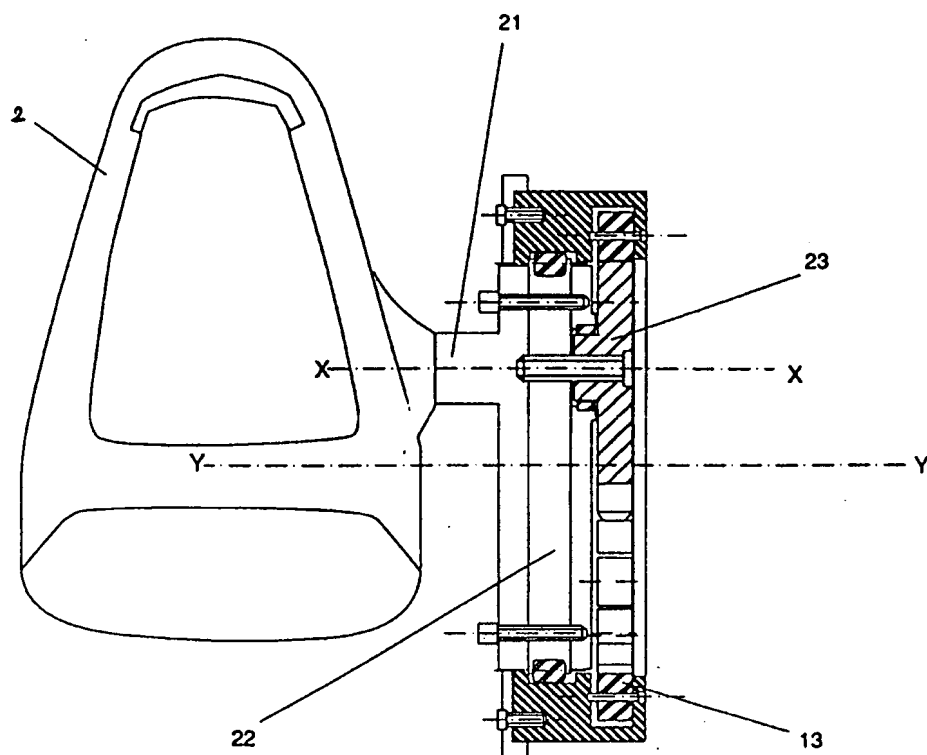


Fig. 3 sec. Z-Z

INTERNATIONAL SEARCH REPORT

Intern: 11 Application No

PCT/IT 98/00141

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B62M3/04 B62M1/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B62M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 761 528 A (MATSUURA) 12 March 1997 see the whole document -----	1-3

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 761528 A	12-03-1997	CA 2183708 A	06-03-1997
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